WHAT IS CLAIMED IS:

	1.	Α	method	comprising:
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- observing a finite duration signal y_n that comprises
- 3 a representation of a mixture of a desired signal and an
- 4 undesired signal, the undesired signal comprising an offset
- 5 component;
- 6 modeling the offset component of the undesired
- 7 signal as comprising a step function u defined by unknown step
- 8 function parameters;
- 9 estimating the unknown step function parameters; and
- adjusting y_n based on the estimated step function
- 11 parameters.
- 1 2. The method of claim 1 in which y_n comprises a
- 2 continuous signal.
- 1 3. The method of claim 1 in which y_n comprises a
- 2 discrete signal.
- 1 4. The method of claim 3 in which:
- y_n includes N samples and comprises a discrete
- 3 representation of a mixture of the desired signal, the
- 4 undesired signal, and a second signal including a generally

- 5 sinusoidal waveform and an attenuated version of the desired
- 6 signal; and
- y_n is modeled as including a discrete representation
- 8 of the desired signal and a discrete representation of an
- 9 offset component related to a square of the undesired signal,
- in which the offset component is modeled as comprising a step.
- 11 function u defined by unknown step function parameters.
- 1 5. The method of claim 1 in which the step function
- 2 parameters include a first parameter c1 indicative of a first
- 3 amplitude of the step function, a second parameter c2
- 4 indicative of a second amplitude of the step function, and a
- 5 third parameter α indicative of a point at which the step
- 6 function transitions from the first amplitude to the second
- 7 amplitude, and in which the desired signal is a function of at
- 8 least one unknown signal parameter θ .
- 1 6. The method of claim 5 in which y_n includes N
- 2 samples and estimating the step function parameters includes
- 3 jointly estimating θ , c1, c2, and α $(0 \le \alpha < N)$ based on a non-
- 4 linear optimization method.
- 1 7. The method of claim 5 in which y_n includes N
- 2 samples and estimating the step function parameters includes

- 3 estimating c1, c2, and α ($0 \le \alpha < N$) based on a maximum
- 4 likelihood method.
- 1 8. The method of claim 7 in which the estimates of
- 2 the step function parameters comprise:
- a first estimate \Box 1 of c1 where

$$\hat{\mathbf{c}}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n \; ;$$

5 a second estimate $\square 2$ of c2 where

$$\hat{c}2 \approx \frac{1}{N - \hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \; ; \text{ and}$$

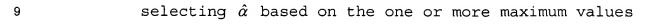
7 a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2, \quad 0 \le \alpha_{Test} < N - 1.$$

- 9. The method of claim 8 in which determining \hat{lpha}
- 2 comprises:
- selecting more than one value of α_{Test} ;
- 4 determining a value g for each selected value of
- 5 α_{Test} where

$$g \approx \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2;$$

- 7 selecting from among the determined values of g one
- 8 or more maximum values of g; and



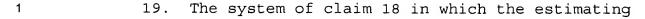
- 10 of q.
- 1 10. The method of claim 9 in which less than N
- 2 values of α_{Test} are selected.
- 1 11. The method of claim 7 in which estimating the
- 2 step function parameters further comprises jointly estimating
- 3 θ , c1, c2, and α based on a non-linear minimization of a
- 4 function comprising

$$f(\theta, c1, c2, \alpha) \approx \sum_{n=0}^{\alpha-1} \left| y_n - \frac{1}{\alpha} \sum_{m=0}^{\alpha-1} y_m - \frac{A_0}{2} s_m(\theta) + \frac{1}{\alpha} \sum_{m=0}^{\alpha-1} \frac{A_0}{2} s_m(\theta) \right|^2 + \sum_{n=\alpha}^{N-1} \left| y_n - \frac{1}{N-\alpha} \sum_{m=\alpha}^{N-\alpha} y_m - \frac{A_0}{2} s_n(\theta) + \frac{1}{N-\alpha} \sum_{m=\alpha}^{N-\alpha} \frac{A_0}{2} s_m(\theta) \right|^2$$

- in which the minimization is performed by computing
- 7 one or more of the derivatives of f.
- 1 12. A system comprising:
- an observation circuit structured and arranged to
- 3 observe a finite duration signal y_n that comprises a discrete
- 4 representation of a mixture of a desired signal and an
- 5 undesired signal, the undesired signal comprising an offset
- 6 component;

- 7 a modeling circuit structured and arranged to model
- 8 the offset component of the undesired signal as comprising a
- 9 step function u defined by unknown step function parameters;
- an estimating circuit structured and arranged to
- 11 determine estimated step function parameters representative of
- 12 the unknown step function parameters; and
- a correction circuit structured and arranged to
- 14 correct y_n based on the estimated step function parameters.
- 1 13. The system of claim 12 in which y_n comprises a
- 2 continuous signal.
- 1 14. The system of claim 12 in which y_n comprises a
- 2 discrete signal.
- 1 15. The system of claim 14 in which:
- 3 representation of a mixture of the desired signal, the
- 4 undesired signal, and a second signal including a generally
- 5 sinusoidal waveform and an attenuated version of the desired
- 6 signal; and
- 7 the modeling circuit is further configured to model
- 8 y_n as comprising a discrete representation of the desired

- 9 signal and also a discrete representation of an offset
- 10 component related to a square of the undesired signal.
- 1 16. The system of claim 12 in which the unknown
- 2 step function parameters include a first parameter cl
- 3 indicative of a first amplitude of the step function, a second
- 4 parameter c2 indicative of a second amplitude of the step
- 5 function, and a third parameter α indicative of a point at
- 6 which the step function transitions from the first amplitude
- 7 to the second amplitude, and in which the desired signal is a
- 8 function of at least one unknown signal parameter θ .
- 1 17. The system of claim 16 in which y_n includes N
- 2 samples and the estimating circuit is further configured to
- 3 estimate jointly the unknown step function parameters θ , c1,
- 4 c2, and α ($0 \le \alpha < N$) based on a non-linear optimization method.
- 1 18. The system of claim 16 in which y_n includes N
- 2 samples and the estimating circuit is further configured to
- 3 estimate the unknown step function parameters c1, c2, and α
- 4 $(0 \le \alpha < N)$ based on a maximum likelihood method.



- 2 circuit is further configured to estimate the unknown step
- 3 function parameters as comprising:
- a first estimate $\square 1$ of c1 where

$$\hat{c}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n ;$$

a second estimate $\Box 2$ of c2 where

$$\hat{c}2 \approx \frac{1}{N - \hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \text{ ; and }$$

8 a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2, \quad 0 \le \alpha_{Test} < N.$$

1 20. The system of claim 19 in which the estimating

- 2 circuit is further configured to determine \hat{lpha} based on the
- 3 following:
- selecting more than one value of α_{Test} ;
- determining a value g for each selected value of
- 6 α_{Test} where

$$g \approx \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2;$$

- 8 selecting from among the determined values of g one
- 9 or more maximum values of g; and

- selecting \hat{a} based on the one or more maximum values of q.
- 1 21. The system of claim 20 in which less than N
- 2 values of α_{Test} are selected by the estimating circuit.
- 1 22. The system of claim 18 in which the estimating
- 2 circuit is further configured to estimate jointly the unknown
- 3 step function parameters θ , c1, c2, and α based on non-linear
- 4 minimization of a function comprising

$$f(\theta, c_1, c_2, \alpha) \approx \sum_{n=0}^{\alpha-1} \left| y_n - \frac{1}{\alpha} \sum_{m=0}^{\alpha-1} y_m - \frac{A_0}{2} s_m(\theta) + \frac{1}{\alpha} \sum_{m=0}^{\alpha-1} \frac{A_0}{2} s_m(\theta) \right|^2 + \sum_{n=\alpha}^{N-1} \left| y_n - \frac{1}{N-\alpha} \sum_{m=\alpha}^{N-\alpha} y_m - \frac{A_0}{2} s_n(\theta) + \frac{1}{N-\alpha} \sum_{m=\alpha}^{N-\alpha} \frac{A_0}{2} s_m(\theta) \right|^2$$

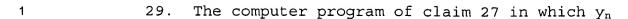
- 6 in which minimization is performed by computing one or more of
- 7 the derivatives of f.
- 1 23. A computer program stored on a computer
- 2 readable medium or a propagated signal, the computer program
- 3 comprising:
- an observation code segment configured to cause a
- 5 computer to observe a finite duration signal y_n that comprises
- 6 a representation of a mixture of a desired signal and an
- 7 undesired signal, the undesired signal comprising an offset
- 8 component;

- a modeling code segment configured to cause the

 computer to model the offset component of the undesired signal

 as comprising a step function u defined by unknown step
- 12 function parameters;
- an estimating code segment configured to cause the
- 14 computer to determine estimated step function parameters
- 15 representative of the unknown step function parameters; and
- a correcting code segment configured to cause the
- 17 computer to correct y_n based on the estimated step function
- 18 parameters.
- 1 24. The computer program of claim 23 in which y_n
- 2 comprises a continuous signal.
- 1 25. The computer program of claim 23 in which y_n
- 2 comprises a discrete signal.
- 1 26. The computer program of claim 25 in which:
- y_n includes N samples and comprises a discrete
- 3 representation of a mixture of the desired signal, the
- 4 undesired signal, and a second signal including a generally
- 5 sinusoidal waveform and an attenuated version of the desired
- 6 signal;

- 7 a modeling code segment configured to cause the
- 8 computer to model y_n as comprised of s_n , a discrete
- 9 representation of the desired signal and also a discrete
- 10 representation of an offset component related to a square of
- 11 the undesired signal, in which the modeling code segment also
- 12 is configured to cause the computer to model the offset
- 13 component as comprising a step function u defined by unknown
- 14 step function parameters.
- 1 27. The computer program of claim 23 in which the
- 2 unknown step function parameters include a first parameter c1
- 3 indicative of a first amplitude of the step function, a second
- 4 parameter c2 indicative of a second amplitude of the step
- 5 function, and a third parameter α indicative of a point at
- 6 which the step function transitions from the first amplitude
- 7 to the second amplitude, and in which the desired signal is a
- 8 function of at least one unknown signal parameter θ .
- 1 28. The computer program of claim 27 in which y_n
- 2 includes N samples and the estimating code segment further
- 3 comprises a non-linear optimization code segment configured to
- 4 cause the computer program to estimate jointly the unknown
- 5 step function parameters θ , c1, c2, and α $(0 \le \alpha < N)$ based on a
- 6 non-linear optimization method.



- 2 includes N samples and the estimating code segment further
- 3 comprises a maximum likelihood code segment configured to
- 4 cause the computer to estimate the unknown step function
- 5 parameters c1, c2, and α ($0 \le \alpha < N$) based on a maximum
- 6 likelihood method.
- 1 30. The computer program of claim 29 in which the
- 2 maximum likelihood code segment is further configured to cause
- 3 the computer to estimate the unknown step function parameters
- 4 as comprising:
- a first estimate \Box 1 of c1 where

$$\hat{\mathbf{c}} 1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n \; ;$$

7 a second estimate $\Box 2$ of c2 where

$$\hat{c}2 \approx \frac{1}{N-\hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \text{ ; and }$$

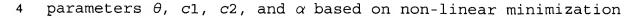
9 a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2, \quad 0 \le \alpha_{Test} < N.$$

- 1 31. The computer program of claim 30 in which the
- 2 maximum likelihood code segment further comprises:
- a selecting code segment configured to cause the
- 4 computer to select more than one value of α_{Test} ;
- a calculating code segment configured to cause the
- 6 computer to determine a value g for each selected value of
- 7 α_{Test} where

$$g \approx \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2;$$

- a g max code segment configured to cause the
- 10 computer to select from among the determined values of g one
- or more maximum values of g; and
- 12 an $\hat{\alpha}$ _max code segment configured to cause the
- 13 computer to select \hat{lpha} based on the one or more maximum values
- 14 of g.
 - 1 32. The computer program of claim 31 in which the
 - 2 selecting code segment is further configured to cause the
 - 3 computer to select less than N values of α_{Test} .
 - 1 33. The computer program of claim 29 in which the
 - 2 maximum likelihood code segment is further configured to cause
 - 3 the computer to estimate jointly the unknown step function



5 of a function comprising

$$f(\theta, c1, c2, \alpha) \approx \sum_{n=0}^{\alpha-1} \left| y_n - \frac{1}{\alpha} \sum_{m=0}^{\alpha-1} y_m - \frac{A_0}{2} s_m(\theta) + \frac{1}{\alpha} \sum_{m=0}^{\alpha-1} \frac{A_0}{2} s_m(\theta) \right|^2 + \sum_{n=\alpha}^{N-1} \left| y_n - \frac{1}{N-\alpha} \sum_{m=\alpha}^{N-\alpha} y_m - \frac{A_0}{2} s_n(\theta) + \frac{1}{N-\alpha} \sum_{m=\alpha}^{N-\alpha} \frac{A_0}{2} s_m(\theta) \right|^2$$

- 7 in which the minimization is performed by computing one or
- 8 more of the derivatives of f.
- 1 34. A processor which:
- observes a finite duration signal y_n that comprises
- 3 a representation of a mixture of a desired signal and an
- 4 undesired signal, the undesired signal comprising an offset
- 5 component;
- 6 models the offset component of the undesired signal
- 7 as a step function u defined by unknown step function
- 8 parameters;
- 9 determines estimated step function parameters; and
- 10 corrects the signal y_n based on the estimated step
- 11 function parameters.
- 1 35. The processor of claim 34 in which y_n comprises
- 2 a continuous signal.

- 1 36. The processor of claim 34 in which y_n comprises
- 2 a discrete signal.
- 1 37. The processor of claim 36 in which:
- y_n includes N samples and comprises a discrete
- 3 representation of a mixture of the desired signal, the
- 4 undesired signal, and a second signal including a generally
- 5 sinusoidal waveform and an attenuated version of the desired
- 6 signal; and
- y_n is modeled as including a discrete representation
- 8 of the desired signal and also a discrete representation of an
- 9 offset component related to a square of the undesired signal,
- 10 and models the offset component as a step function u defined
- 11 by unknown step function parameters.
- 1 38. The processor of claim 34 in which y_n includes
- 2 N samples and the unknown step function parameters include a
- 3 first parameter cl indicative of a first amplitude of the step
- 4 function, a second parameter c2 indicative of a second
- 5 amplitude of the step function, and a third parameter α
- 6 $(0 \le \alpha < N)$ indicative of a point at which the step function
- 7 transitions from the first amplitude to the second amplitude.



- 1 39. The processor of claim 38 in which the
- 2 processor estimates the unknown step function parameters as
- 3 comprising:
- a first estimate $\Box 1$ of c1 where

$$\hat{c}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n ;$$

a second estimate $\square 2$ of c2 where

$$\hat{c}2 \approx \frac{1}{N - \hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \; ; \quad \text{and} \quad$$

a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N - \alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2.$$